CLAIMS:

1. A reciprocating pump comprising:

an action chamber having a volume;

a volume changing body, which defines at least a part of the action chamber and is displaced for changing the volume of the action chamber, wherein fluid is drawn into the action chamber and is discharged from the action chamber in accordance with the displacement of the volume changing body;

a drive shaft, which rotates about its own axis, wherein a groove is formed on a circumference of the drive shaft;

a movable body, which is engaged with the groove and is connected to the volume changing body;

wherein, when the drive shaft is rotated, the movable body is guided by the groove to reciprocate along the axis of the drive shaft, and wherein, when the movable body reciprocates, the volume changing body is displaced along the axis of the drive shaft.

2. The pump according to claim 1, wherein the groove is an annular groove that circles around the circumference of the drive shaft.

3. The pump according to claim 1, wherein the movable body is a roller that is rotatable about an axis that intersects the axis of the drive shaft, and wherein a circumference of the roller engages of a side surface of the groove.

4. The pump according to claim 1, further comprising a guide body, which supports the movable body and is connected to the volume changing body.

5. The pump according to claim 4, wherein the guide body is cylindrical and is fitted in the drive shaft to move integrally with the movable body along the axis of the drive shaft.

6. The pump according to claim 5, further comprising a baffle mechanism, wherein the baffle mechanism permits the guide body to move along the axis of the drive shaft and prevents the guide body from rotating about the axis of the drive shaft.

7. The pump according to claim 6, further comprising a pump housing, wherein the baffle mechanism includes a guide groove and a projection portion, the guide groove being located on one of the pump housing and the guide body, and the projection portion being located on the other one of the pump housing and the guide body, and wherein the projection portion engages with the guide groove and extends in parallel with the axis of the drive shaft.

8. The pump according to claim 7, wherein the volume changing body is a diaphragm, wherein the guide body is connected to the diaphragm such that the guide body is permitted to rotate relative to the diaphragm and that movement of the guide body along the axis of the drive shaft is transmitted to the diaphragm.

9. The pump according to claim 8, further comprising a holding piece connected to the diaphragm, wherein a part of the guide body is held between the holding piece and the diaphragm with respect to the direction of the axis of the drive shaft, and is rotatable relative to the holding piece and the diaphragm.

10. The pump according to claim 1, wherein the volume

changing body is a diaphragm.

11. The pump according to claim 1, further comprising a guide body, which supports the movable body, and a baffle mechanism, wherein the baffle mechanism permits the guide body to move along the axis of the drive shaft and prevents the guide body from rotating about the axis of the drive shaft, wherein the volume changing body is a diaphragm, and wherein the guide body is connected to the diaphragm such that the guide body is permitted to rotate relative to the diaphragm and that movement of the guide body along the axis of the drive shaft is transmitted to the diaphragm.

12. The pump according to claim 1, further comprising a pump housing, a guide body, which supports the movable body, and a baffle mechanism, wherein the baffle mechanism permits the guide body to move along the axis of the drive shaft and prevents the guide body from rotating about the axis of the drive shaft, wherein the volume changing body is a diaphragm, and wherein the guide body is connected to the pump housing without using the diaphragm to prevent the movable body from rotating relative to the pump housing.

13. A vacuum pump that draws gas by operating a gas conveying body in a pump chamber through rotation of a rotary shaft, the vacuum pump comprising:

a main pump having an exhaust volume, which has an exhaust space for exhausting drawn gas, wherein the main pump has a counterflow prevention mechanism for preventing the couterflow of gas, wherein the counterflow prevention mechanism is located in the exhaust space;

an auxiliary pump having an exhaust volume, which is connected to the exhaust space and exhausts gas from the exhaust space, wherein the exhaust volume of the auxiliary pump is smaller than the exhaust volume of the main pump,

the auxiliary pump comprising:

an action chamber having a volume;

a volume changing body, which defines at least a part of the action chamber and is displaced for changing the volume of the action chamber, wherein gas is drawn into the action chamber and is discharged from the action chamber in accordance with the displacement of the volume changing body;

a drive shaft, which rotates about its own axis, wherein a groove is formed on a circumference of the drive shaft;

a movable body, which is engaged with the groove and is connected to the volume changing body;

wherein, when the drive shaft is rotated, the movable body is guided by the groove to reciprocate along the axis of the drive shaft, and wherein, when the movable body reciprocates, the volume changing body is displaced along the axis of the drive shaft.

14. The vacuum pump according to claim 13, wherein the auxiliary pump draws gas from a part of the exhaust space that is upstream of the counterflow prevention mechanism and exhausts the drawn gas to a part of the exhaust space that is downstream of the counterflow prevention mechanism.

15. The vacuum pump according to claim 13, wherein the rotary shaft and the drive shaft are driven by a common electronic motor.

16. The vacuum pump according to claim 13, wherein the auxiliary pump further has a guide body, which supports the movable body, and a baffle mechanism, wherein the baffle mechanism permits the guide body to move along the axis of the drive shaft and prevents the guide body from rotating about the axis of the drive shaft, wherein the volume

changing body is a diaphragm, and wherein the guide body is connected to the diaphragm such that the guide body is permitted to rotate relative to the diaphragm and that movement of the guide body along the axis of the drive shaft is transmitted to the diaphragm.

17. The pump according to claim 13, wherein the auxiliary pump further has a pump housing, a guide body, which supports the movable body, and a baffle mechanism, wherein the baffle mechanism permits the guide body to move along the axis of the drive shaft and prevents the guide body from rotating about the axis of the drive shaft, wherein the volume changing body is a diaphragm, and wherein the guide body is connected to the pump housing without using the diaphragm to prevent the movable body from rotating relative to the pump housing.